measuring and monitoring light waves by generating a photocurrent from light of one or more wavelengths that is reflected by a grating and absorbed by an absorption section. In particular, as taught by the present invention as defined in the amended independent claims 1 and 5, the semiconductor device/photodetector comprises a distinguishing feature that a tuning section for changing the effective index of the grating so that only a particular wavelength is selected to be reflected and therefore absorbed by said absorption section. With the present invention, the effective index of the grating is tunable during the measurement, thus the measurement can be carried out wavelength by wavelength with the same grating, which substantially increases the measuring speed. In a preferred embodiment, the tuning section comprises an electrode , and the effective index of the grating is changed by changing an electrical current injected into the electrode, as defined in claims 31 and 33.

The applicants do not agree with the allegation of the Examiner that the present invention has been anticipated by Matsui (JP 63111679 A). In particular, the applicants do not agree with the allegation of the Examiner that "the electrode 18 functions as a tuning section", and that the element 17 is "means for selecting a particular wavelength by changing said effective index of said grating" as stated in the Office Action since such allegation lacks support from the disclosure in Matsui. Matsui discloses a semiconductor element which can detect only a part of light in an optical waveguide layer and propagate the other light through this layer. As disclosed in Matsui and shown in Figure 1, the light satisfying the Bragg reflection condition is reflected by the grating 14 to the absorption layer 16, from which a photocurrent is generated by the electrode 18 which is positioned on the depletion region 17 of the absorption layer 16. It can be

found nowhere in Matsui that the electrode 18 or the depletion region 17 functions as a tuning section for changing the effective index of the grating 14, as alleged by the Examiner. In fact, like the electrode 106A in the present application, the electrode 18 functions to generate photocurrent from the reflected light that is absorbed by the absorption layer 16 and the depletion region 17. Though it is well known in the art (such as Deacon patent US 6,373,872) that the effective index of a grating can be tuned in various ways including by changing an electrical current injected to an electrode provided on the device, but in Matsui the electrode 18 functions to generate a photocurrent from the reflected light, but does not function as a tuning section to change the effective index of the grating 14. There is no teaching in Matsui that a current is injected into the electrode 18 to determine the effective index of the grating 14 and is changeable so as to change the effective index of the grating 14. There is no such a teaching in Figure 3 either. In Figure 3, three different grating 14a, 14b and 14c are arranged along the waveguide for reflecting light of three different wavelengths, and the electrodes 18a, 18b and 18c function to generate photocurrents from the respective reflected light wavelength but not as tuning section for changing the effective index of any of the gratings 14a, 14b and 14c. In fact, throughout the disclosure in Matsui, there can not be found anywhere a teaching or implication that the effective index of the grating 14 or 14a-14c is tunable or changeable. In a word, Matsui does not disclose any tuning means to change the effective index of any of the gratings. 14, 14a-14c. Therefore, the applicants believe that claims 1 and 5 are not anticipated by Matsui as alleged by the Examiner.

Furthermore, the applicants do not agree with the allegation of the Examiner that in

Chandrasekhar (US 5,689,122) the contact 22 reads as "the tuning section" of the present invention and that the p-contact layer 7 functions "for selecting a particular wavelength by changing said effective index of said grating" because such allegation lacks support from the disclosure of Chandrasekhar. Such alleged functions can be found nowhere in Chandrasekhar. As described in Chandrasekhar, the contact 22 and the p-contact layer 7 are elements of the p-i-n photodiode 12 and are positioned above an absorber layer 6 (col. 2, lines 55 – 58). It can not be found anywhere throughout Chandrasekhar an explanation or description that the contact 22 or the p-contact layer 7 is a tuning section for changing said effective index of said grating so that only a particular wavelength is selected to be reflected and therefore absorbed by said absorption section, which is a distinguishing feature of the present invention. This distinguishing feature can not be found in Nitta et al (US 6,252,895) either. Therefore, the applicants believe that claim 5 is not obvious over Chandrasekhar or Nitta et al or their combination.

Therefore, independent claims 1 and 5 are not anticipated by Matsui and claim 5 is not obvious by Chandrasekhar in view of Nitta. The above feature as underlined can not be found in other two cited patents, Aoki et al and Rushing either. Thus, claims 1 and 5 are patentable. At least for the same reasons, their dependent claims 2-4, 6-16, 18-19, 31, 33-35 are also patentable.

In addition, the applicants can not found anywhere in Chandrasekhar a disclosure or implication that the p-contact layer 7 is used for changing an electrical current input to the electrode 22, as alleged by the Examiner. In fact, there is no teaching in Chandrasekhar on changing an electrical current injected into the electrode so as to change the effective index of

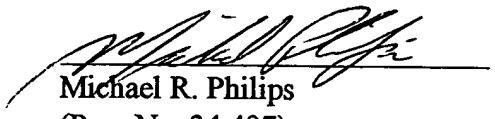
the grating (if there is an implied grating as presumed by the Examiner). Therefore, the above feature as defined in claims 31 and 33 of present application is not disclosed in Chandrasekhar either, and thus strengthens the patentability of claims 31 and 33.

Thus, the applicants respectfully request reconsideration based on the amendment and remarks as above. Any fees believed due should be charged to our Deposit Account No. 11-0223.

Respectfully submitted,

KAPLAN & GILMAN, L.L.P.
900 Route 9 North
Woodbridge, NJ 07095
Telephone (732) 634-7634

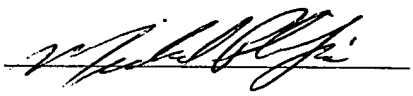
DATED: October 28, 2002



Michael R. Philips
(Reg. No. 34,407)

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal service as first class mail, in a postage prepaid envelope, addressed to Box RCE, Commissioner for Patents, Washington, D.C. 20231 on October 28, 2002.

Dated October 28, 2002 Signed  Print Name Michael R. Philips

MARKED-UP VERSION OF AMENDED CLAIMS 1, 5, 31 and 33

1. (Twice Amended) A semiconductor device comprising:

[a buried grating;]

a waveguide core for passing light therethrough;

a grating with an effective index for reflecting one or more wavelengths of said light;

an absorption section for absorbing said reflected wavelengths and generating a photocurrent from said absorbed wavelengths; and

a tuning section for changing [an] said effective index of said grating so that only a particular wavelength is selected to be reflected by said grating and therefore absorbed by said absorption section.

5. (Twice amended) A semiconductor photodetector device comprising:

a substrate of a first doping type;

an undoped region, laterally disposed above the substrate;

[a grating positioned between the substrate and the updoped region;]

a waveguide laterally disposed above the updoped region for passing light therethrough;

a grating with an effective index positioned between the substrate and the updoped region for reflecting one or more wavelengths of said light;

an upper region, of a second doping type, laterally disposed above the waveguide region [, where the waveguide is of a different atomic composition than the substrate, updoped region, and upper region];

an absorption section positioned above said upper region for absorbing said

reflected wavelengths and generating a photocurrent from said absorbed wavelengths;

a tuning section for changing [an] said effective index of said grating so that only a particular wavelength is selected to be reflected and therefore absorbed by said absorption section..

31. (Amended) The semiconductor device of claim [30] 1 wherein said tuning [region] section comprises an electrode, and [said means for selecting comprises means for] said effective index of the grating is changed by changing an electrical current [input to] injected into said electrode.

33. (Amended) The semiconductor [device] photodetector of claim [32] 5 wherein said tuning [region] section comprises an electrode, and [said means for selecting comprises means for] said effective index of the grating is changed by changing an electrical current [input to] injected into said electrode.